

# PATENT COOPERATION TREATY

# PCT


## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 28 JUN 2006

WIPO PCT

Applicant's or agent's file reference TS 6458 PCT	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2005/051227	International filing date (day/month/year) 17.03.2005	Priority date (day/month/year) 19.03.2004	
International Patent Classification (IPC) or national classification and IPC INV. B04C5/14 B04C5/181			
Applicant SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ...et al			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 1 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  11.01.2006		Date of completion of this report  27.06.2006	
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer  Redelsperger, C  Telephone No. +49 89 2399-6058	



# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/EP2005/051227

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
  - ☐ international search (under Rules 12.3(a) and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4(a))
  - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

### Description, Pages

1-8 as originally filed

### Claims, Pages

9, 10 as originally filed  
11 received on 19.01.2006 with letter of 19.01.2006

### Drawings, Sheets

1/1 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**Re: Item V**

**1. Claim 6**

**1.1. Closest Prior Art**

Document WO 00/27949 A (2000-05-18), called D1, is considered to represent the closest available prior art.

D1 describes a separator for cyclonic separation having a vessel, a tangential inlet, a gas outlet conduit and a plurality of liquid outlet openings as the subject-matter of claim 6.

**1.2. Difference**

The subject-matter of claim 6 differs from that of D1, in that the perforated inflow section of the liquid outlet conduit comprises a row of longitudinally spaced perforations and is coaxial to a watercut control unit which is rotatable relative to the fixed lower section and is provided with several rows of longitudinal spaced perforations, said rows having different lengths such that different amounts of perforations of the liquid outlet and watercut control conduit are aligned in response to rotation of the watercut control conduit relative to the liquid outlet conduit.

**1.3. Technical effect**

The technical effect of this differentiating feature is that the level in the separator from which liquid flows into the liquid outlet conduit can be controlled by rotation of the watercut control conduit, thereby controlling the inflow of fluid fractions of different density into liquid outlet conduit.

**1.4. Objective problem**

Providing a separator for cyclonic separation of multiphase fluid mixtures which does not require a bulky gravity separation vessel at the bottom of a vortex tube and which does not produce alternating high and low density liquid slugs.

### **1.5. Inventive step**

Since none of the available prior art documents discloses such a cyclonic separator nor suggest to combine this differentiating feature with the separator of D1, the subject-matter of claim 1 can be considered both, as novel and inventive (Articles 33(1)-(3) PCT).

### **1.6. Industrial applicability**

The industrial applicability is obvious (Art.33(1) and (4) PCT).

## **2. Claim 1**

The subject-matter of claim 1 consists in a method for cyclonic separation of gaseous and liquid fraction by using the separator of claim 6.

The subject-matter of claim 1 can, for similar reasons as those given for claim 6, be considered both, novel, inventive and industrially applicable (Article 33(1)-(4) PCT).

N.B. D1 describes a method for separating solids from a gas-solid containing feed and not a method for cyclonic separation of gaseous and liquid fractions from a multiphase fluid mixture.

### **Re. Item VII**

To meet the requirements of Rule 5.1(a)(ii) PCT the document D1 should be identified in the description and its relevant contents should be indicated.

Independent claims 1 and 6 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT). It should therefore be redrafted accordingly.

The features of the claims should be provided with reference signs placed in parentheses

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(SEPARATE SHEET)**

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to increase their intelligibility (Rule 6.2(b) PCT). This applies to both the preamble and characterising portion.

- a plurality of liquid outlet openings for removing the liquid fraction from the interior of the bottom section of the vessel into a liquid outlet conduit, which openings are located at different vertical levels and through which in use liquid is discharged into a liquid outlet conduit such that liquid components with different densities are mixed into a substantially homogeneous liquid fraction, wherein the liquid outlet openings are formed by axially spaced perforations of a perforated inflow section of the liquid outlet conduit extending in upward direction into a lower part of the interior of the separation vessel, and wherein the perforated inflow section of the liquid outlet conduit comprises a row of longitudinally spaced perforations and is co-axial to a watercut control conduit which is rotatable relative to the fixed lower section and is provided with several rows of longitudinally spaced perforations, said rows having different lengths such that different amounts of perforations of the liquid outlet and watercut control conduit are aligned in response to rotation of the watercut control conduit relative to the liquid outlet conduit.

7. The separator of claim 6, wherein the perforated inflow section of the liquid outlet conduit is substantially co-axial to the central axis of the tubular mid-section of the separation vessel.

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